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# PUBLIC HEALTH REPORTS.

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VOL. XXV.

FEBRUARY 4, 1910.

No. 5.

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## WHAT THE LOCAL HEALTH OFFICER CAN DO IN THE PREVENTION OF TYPHOID FEVER.<sup>a</sup>

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The prevention of typhoid fever stands out clearly as one of the most important problems in sanitation now confronting us in America. The measures required to prevent the spread of this communicable disease are known, but the practical difficulties encountered in getting the known measures carried out constitute the problem.

The widespread and continued high rate of prevalence of this thoroughly preventable disease in the United States should be and is beginning to be considered a national disgrace.

According to the United States census report for 1900, the average typhoid fever death rate in the United States was 46.5 per 100,000 inhabitants. This means that in the census year, which may be taken as an average, there were about 500 cases of, and over 46 deaths from, typhoid fever among every 100,000 persons composing the American nation. The total number of deaths from typhoid fever recorded that year was 35,379, which gave typhoid fever fourth place on the mortality list.

The rate of prevalence of typhoid fever in the United States in comparison with the rates in other countries is high. Thus the annual typhoid death rate per 100,000 inhabitants for the period 1901-1905 was in Scotland, 6.2; in Germany, 7.6; in England and Wales, 11.2; in Belgium, 16.8; in Austria (1901-1904), 19.9; in Hungary, 28.3; in Italy, 35.2; while the rate in the United States during the same period was about 46 (estimated). Some of these European countries now having relatively low rates formerly had high rates. Their climatic conditions seem to be as favorable to typhoid infection as those of the United States as a whole. Therefore, it appears reasonable to conclude that their decidedly lower typhoid rates are due to better enforcement of the measures which prevent the disease.

### ERRONEOUS AND FATALISTIC VIEWS IN REGARD TO TYPHOID FEVER.

The familiarity of the public with typhoid fever, besides having given rise to many erroneous views regarding the etiology of the disease, has caused an unfortunate tendency on the part of people gener-

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<sup>a</sup> Read at the annual meeting of the municipal health officers of Ohio, held at Columbus, Ohio, January 20-21, 1910.

ally to accept the occurrence every year of a certain amount of typhoid fever as inevitable. For much of the popular ignorance in regard to the etiology of the disease, and for the too frequent adoption by the public of a fatalistic view in regard to its occurrence, the medical profession is largely responsible. It should be considered a duty incumbent upon practicing physicians, and upon health officers particularly, to embrace every opportunity to prevent or correct these erroneous views, and to convey to the layman such knowledge as will be useful in the prevention of disease and death.

Even at the present time it is not unusual to hear it said by those who should be better informed that typhoid fever "comes only from a run-down system," or that the disease is "infectious" but not "contagious." Not many years ago the disease was regarded rather generally as being wholly, or almost wholly, a water-borne disease, and the purity of a community's water supply was estimated from its typhoid death rate. By careful epidemiologic studies of the subject it has been learned that in some communities there may be a high typhoid death rate due largely, or even entirely, to factors other than water in the spread of the infection; and sanitarians now regard the rate of prevalence of typhoid fever in a given community as a fair measure of the sanitary intelligence exercised by that community, not only in regard to the water supply but in regard to all other factors concerned in the transmission of typhoid infection.

The occurrence of yellow fever at some place in the United States will attract widespread attention, and as a rule heroic measures will be adopted to eradicate it. It is probable that in the United States more deaths have been caused by typhoid fever every year in the last decade than have been caused by yellow fever in the last fifty years; yet in many communities in which typhoid fever is highly prevalent year after year nothing is done to lessen or eradicate it, simply because the people have become accustomed to having it and do not demand that anything be done to prevent it.

As the attention of children is attracted to new toys, so is the attention of grown-ups attracted to the new and diverted from the old, and perhaps vastly more important, problems.

From the results of recent investigations it is estimated that there are now in the United States about 5,000 cases of pellagra.<sup>a</sup> From the obtainable data it may be estimated that there have been in the past twelve months in the United States about 400,000 cases of typhoid fever. The occurrence of pellagra in our country is a comparatively recent discovery, and it has attracted widespread and keen popular interest, while typhoid fever, a disease which, at a conservative estimate, causes annually in the United States fifty times as many deaths as does pellagra, attracts little popular interest except in occasional instances of outbreaks, such as those caused by a bacillus carrier or by highly infected water or milk, which present unusual features.

In order to get sufficient interest aroused in our old problems of disease prevention, it seems necessary to present these problems in new attire, so that they will compel attention. The excellent effects on the campaign against tuberculosis which were accomplished by

<sup>a</sup> Lavinder, C. H.: "The prophylaxis of pellagra;" Public Health Reports, October 29, 1909, vol. 24, No. 44.

the International Tuberculosis Congress held in Washington in the fall of 1908 suggest the advisability of having some time in the near future at some place in the United States a typhoid fever congress, either national or international in scope, to be conducted on the same general plan as to exhibits, scientific papers, etc., as was the International Congress on Tuberculosis.

#### PRINCIPLES OF PREVENTION BASED ON PRESENT KNOWLEDGE OF THE DISEASE.

All the evidence obtained by epidemiologic studies of the disease seems to support the now quite generally accepted view that typhoid fever is a communicable disease spread from person to person, and that the disease is communicated when the germs in the excreta (feces, urine, and, in rare instances, the sputum) from infectious persons (typhoid fever patients and typhoid bacillus carriers) are conveyed in some way to the alimentary canals of other persons. There appears to be no longer any room for reasonable doubt that the disease is "contagious" or directly transmissible from the sick to the healthy, and that it is also "infectious" or indirectly transmissible from the sick to the healthy. If these views be correct, the actual infective agent must be parasitic in nature and dependent on man as its permanent host for its perpetuation. There is abundant evidence presented by the results of epidemiologic studies, however, that this agent will live for a variable time, depending on a number of different conditions, after being discharged from the human body. Its biological features, so far as they have been determined, correspond to those of the Eberth-Koch-Gaffky bacillus, or "typhoid bacillus," which organism for practical purposes may be, and at present should be, accepted as the specific causative agent of typhoid fever. Therefore, in the adoption of measures to prevent the disease we should consider not only the bodies of infectious persons as constituting primary sources of infection, but also the various vehicles, such as water, fingers, foods, flies, etc., which after receiving the specific organisms contained in the discharges from infectious persons may constitute immediate sources of infection.

Preventive measures carried out in accordance with this view have, in every instance in which sufficient thoroughness has been exercised, proved successful.

It is possible that there are some as yet entirely unknown factors in the etiology of typhoid fever, particularly among those concerned in the establishment of individual susceptibility to the infection, which if known might have a practical bearing on measures to prevent the disease; but in the science of sanitation, as in other sciences, there is no justification for postponing the application of present knowledge because the future may hold important discoveries.

The methods of preventing typhoid fever which are now considered the best may appear some time in the future to be crude, but such speculation affords no excuse for failing to carry out these methods provided they are justified by the promised results. There is no longer any room for reasonable doubt that preventive measures based on present knowledge of the subject are effective, and as the expenses and inconveniences incident to their enforcement are insignificant when compared with the beneficial results which they have

been proved to accomplish, there seems to be no excuse for any community to fail to have these measures thoroughly carried out.

For the local health officer the two principal plans of action to prevent typhoid fever in his community should be as follows:

(1) The prevention of the spread of the infection from persons in the community who harbor the infectious organisms (typhoid fever patients and typhoid bacillus carriers);

(2) The prevention of the introduction of infection into the community from without through various channels, such as the water supply, the milk supply, and the general food supply.

In efforts to carry out either of these plans of action a number of practical difficulties will be encountered, but the ability of the health officer to overcome just such difficulties is the best index of his efficiency. It has been said that every community under a democratic form of government has as good public officials as it deserves. There is no public official who can do more to make his community more deserving in respect to the usefulness of his office than can the health officer.

#### FUNCTIONS OF THE LOCAL HEALTH OFFICER.

The functions of the local health officer are administrative and educative. In fulfilling one of these functions he necessarily, to some extent, fulfills the other, and in fulfilling either the factors of personal equation are all important. Given similar situations, one man as health officer will accomplish practically nothing for the advancement of sanitation, while another will accomplish a great deal.

The qualifications of a local health officer necessary for success are diligence, conscientiousness, thorough acquaintance with his community, an up-to-date knowledge of the best measures to prevent infectious disease, and the ability to use common sense methods in the application of such knowledge. Either perfunctoriness or a too strict attention to legal technicalities on the part of the health officer may explain the failure to get desirable results.

In no part of the whole field of medicine is specialism better justified than in that of sanitation or disease prevention. The health officer may be well qualified to practice medicine or surgery, but if he does so a certain amount of his time will be taken away from his public-health work, and besides he will not get the same support from his professional brothers as he would if he were not a competitor for private practice.

The position of health officer in all instances should carry, and in the vast majority of instances does carry, duties and responsibilities which are sufficiently important and extensive to keep the incumbent thoroughly occupied; and it should also carry a salary sufficiently ample to make the engaging by an efficient incumbent in pursuits other than those of his official position unwarranted.

At the present time there are few if any positions, public or private, which are so poorly compensated as that of health officer. That this is the case is largely the fault of the health officers themselves. Many health officers do not sufficiently advertise their wares. The community is willing to pay for convincing results but not for good intentions. The proper administration of laws for the prevention of infectious diseases in a community will have an educative effect because the people will eventually see and appreciate the results accomplished, and so a popular demand may be created for the enact-

ment of better or more drastic laws. Thus the opportunities of the office expand, and the health officer is to a large extent the creator of his own future. Of the widely prevalent infectious diseases none promises better results from equivalent amounts of intelligent effort at prevention than does typhoid fever, and in the prevention of this disease, therefore, the local health officer has a great opportunity.

#### WHAT THE LOCAL HEALTH OFFICER CAN DO IN THE PREVENTION OF TYPHOID FEVER.

(1) *Become informed as to the best known methods of prevention.*—As the methods of preventing typhoid fever consist largely of proper care of the excreta from sick persons and of proper general sewage disposal, they are embraced to a considerable degree in the elementary principles of general sanitation, and should be known by everyone in this age and generation holding the position of health officer. When a health officer does not know these methods it is the fault of the system by which he has been appointed and by which he holds his position, and it is his plain duty to correct the error of the appointing authority either by becoming equipped with the necessary knowledge or by resigning in favor of someone who is already so equipped. Such knowledge is now readily available, and there is no excuse for any health officer not to possess it. The community also is to blame for incompetency on the part of the health officer. The average intelligent citizen will consider carefully the reputed skill of the surgeon to whom he is to submit himself or some member of his family for a surgical operation, but as a rule will pay little or no attention to the administration of the health office, on which the health of his whole household in a way depends continually, so long as such administration does not interfere with his business or cause him some personal inconvenience. It is human nature to take steps to avoid immediate and evident dangers, but to trust blindly to chance to avoid those which are apparently remote but no less real.

(2) *Secure the prompt report of recognized cases and of suspected cases, so that preventive measures may be begun early.*—In many cases of typhoid fever a positive diagnosis can not be made from the symptomatology alone until the end of the second week of illness or later. In some cases, running a mild or an irregular course, the most skilled clinician, without the assistance of laboratory tests, may not be able to make a perfectly positive diagnosis even after having had the cases under observation throughout the attack. In frequent instances infection is discharged from typhoid fever patients from the very beginning of illness. Therefore it is highly important to begin precautionary measures early. This can not be done in many cases if the establishment of a positive clinical diagnosis is waited for. The early adoption of prophylactic measures in one or two undiagnosed cases may prevent an epidemic. The health officer should endeavor to get the physicians or other persons in charge of a person suffering from or presenting symptoms suggestive of typhoid fever to report the case to the health office as one of recognized or suspected typhoid fever within twenty-four or forty-eight hours after taking charge of such person.

The early report of cases and suspected cases should be made a legal requirement if possible. If it is not possible to secure such action by

legal requirement the health officer should endeavor by moral suasion and by every possible bond of professional ethics to secure it. Whenever practicable, the health officer should furnish without cost clinical consultants and laboratory facilities to aid in the early diagnosis of cases.

(3) *Advise and have carried out at the patient's bedside efficient methods of prevention.*—In communities where the greater part of the infection is not introduced from without through water supplies, milk supplies, etc., the bedsides of patients as a rule constitute the principal source of infection. The Typhoid Fever Board of the Public Health and Marine-Hospital Service reports<sup>a</sup> that of the cases of typhoid fever originating in the District of Columbia during the seasons (May 1 to November 1) of 1907 and 1908 about 20 per cent gave a history of direct or indirect association with previous cases in the febrile stage of the disease, and were attributed to contact infection. Similar findings, no doubt, could be obtained in other communities in which the infection now is regarded as being almost entirely, if not entirely, water-borne.

The destruction of the infection at the patient's bedside is a comparatively simple undertaking, but once the infection is allowed to escape from the patient's room, the tracing of it and the destruction of it are, under the complex conditions of urban life, very difficult, if not impossible.

The local health officer should endeavor to secure the enforcement of proper prophylactic measures at the bedside of every typhoid fever patient in his community. The patient should be reasonably isolated and efficient disinfectants should be used in an efficient manner. If these things can not be done properly at the patient's residence, the patient should be sent to a hospital for treatment. The health officer should be legally empowered to have these measures carried out; if he is not so empowered he can accomplish a great deal by the use of moral suasion on the family and the attending physician of the patient.

Practicing physicians, as a body, should not be depended on to advise and have carried out the prophylactic measures. Some practicing physicians are not properly informed on the subject; others will not take the time and trouble; and some, fortunately a decided minority, will inform the family that the use of disinfectants is unnecessary because "the medicine being given kills the germs in the patient."

Of about 2,000 cases treated at private residences and investigated in the District of Columbia during 1906, 1907, and 1908, the use of disinfectants in stools and urine was efficient for only about one-third.<sup>b</sup> All of these cases were attended by and had been reported by physicians. The figures make a rather poor showing, yet probably a better one than would figures similarly obtained from the average community in the United States. A health officer in visiting a home for the purpose of preventing the spread of infection from a typhoid-fever patient should make his instructions to the family plain and

<sup>a</sup> Report No. 2 on the "Origin and prevalence of typhoid fever in the District of Columbia, 1907," by M. J. Rosenau, L. I. Lumsden, and J. H. Kastle, Hygienic Laboratory Bulletin No. 44; Report No. 3, 1908, same authors, Hygienic Laboratory Bulletin No. 52.

<sup>b</sup> Hygienic Laboratory Bulletin No. 52, p. 154.

practicable. He should become assured that the disinfectant solutions are made properly and used properly. In many instances by making two or more visits to the home he can accomplish results which at his first visit appeared highly improbable.

(4) *Have preventive measures continued as long as the dejecta are infective.*—The majority of typhoid fever convalescents, by the time they are able to walk around, no longer discharge typhoid bacilli in their dejecta. Some persons, apparently entirely recovered from the disease, however, continue to discharge typhoid bacilli in their urine or feces, or in both, for months or even years. From the results of rather extensive bacteriologic examinations by Lentz,<sup>a</sup> Klinger,<sup>b</sup> von Drigalski<sup>c</sup> and others, it may be estimated that about 3 per cent of persons who have typhoid fever become chronic bacillus carriers.

Specimens of feces and urine from 307 persons who had had typhoid fever in the five years previous were examined bacteriologically at the Hygienic Laboratory in Washington during 1909, and 8, or about 2.5 per cent, of these persons were determined to be bacillus carriers.

Probably a good many more than 3 per cent of persons recovered from typhoid fever continue to discharge typhoid bacilli for two or three weeks after convalescence is established. On general principles the use of disinfectants in the stools and urine of typhoid convalescents should be continued for at least two weeks after defervescence, and, whenever practicable, bacteriologic examinations of the dejecta should be made and the convalescent not discharged from the supervision of the health officer until at least two such examinations have given negative results for the typhoid bacillus. Such bacteriologic examinations should be made a requirement for all cases treated in hospitals, cities, towns, and other places where properly equipped laboratories are available. Every city health office should have a laboratory equipped for such examinations. If a law requiring the examination of specimens from typhoid convalescents can not be secured immediately, the health officer can obtain the specimens in the vast majority of instances after properly explaining to the patient, the family, and the physician the importance of having the examination made.

(5) *Discover bacillus carriers and safeguard against the spread of infection from them.*—Typhoid bacillus carriers in a community may be discovered (1) by making bacteriologic examinations of specimens of feces and urine from all persons who have typhoid fever and who on request will submit specimens. The typhoid fever board of the Public Health and Marine-Hospital Service and the health department of the District of Columbia, acting cooperatively, have had very good success by this method in Washington; (2) by the epidemiologic study of cases of typhoid fever. A series of cases in a household, with some of the intervals between cases too long for the cases to be accounted for by contact between patients, is suggestive, and specimens should be obtained from those who have had typhoid previous to the case under investigation. An unusual occurrence of cases among persons supplied with foods or beverages from certain grocery stores, bakeries, or dairies should direct attention to the personnel of

<sup>a</sup> Lentz; Hyg. Rundschau, 1906, vol. 16, p. 1068.

<sup>b</sup> Klinger; Arb. a. d. k. Gesundhts., 1906, vol. 24, p. 91.

<sup>c</sup> von Drigalski; Deut. Vrtljhr. f. off. Gesundheitspflege, 1906, vol. 38, p. 19.



such places. In the course of the study a directory of the house servants employed in the homes of cases should be kept, and if it is found that typhoid frequently occurs in homes at which certain servants are employed specimens from such servants should be examined.

After bacillus carriers are discovered, what to do with them becomes a difficult problem. These persons, as a rule, are in apparently good health and able to pursue their vocations and avocations. To require a strict isolation or quarantine of them as a class would be decidedly radical, almost as radical, in fact, as it would be to require the isolation of all cases of incipient pulmonary tuberculosis. The health officer should be given legal authority (1) to place and hold in quarantine any typhoid bacillus carrier who will not take or who from lack of intelligence can not be expected to take the necessary precautions prescribed by the health officer, to minimize to a reasonable degree the likelihood of infection being spread from the excreta of the bacillus carrier; and (2) to prohibit any typhoid bacillus carrier whatsoever from engaging in certain occupations, such as will involve the handling by such persons of foods and beverages for public sale and which are usually eaten or drunk without cooking subsequent to purchase. In lieu of such authority the health officer here again can use moral suasion to good advantage in the vast majority of instances. The intelligent and conscientious person who is a bacillus carrier, if properly informed as to his condition, will take precautions to keep from spreading the infection. The average intelligent person, with an understanding of the danger from bacillus carriers, will not employ a bacillus carrier to work in a bakery, restaurant, dairy, grocery store, or in the dining room, kitchen, or nursery of his family. It would certainly seem no more than fair to have legal provision made for reasonable compensation of any bacillus carrier who on account of the restrictions imposed would be seriously hindered in the earning of a livelihood.

(6) *Secure proper disposal of sewage.*—Typhoid fever may be spread from the dejecta (1) of persons in the early stages of the disease and who have not become ill enough to take to bed; (2) of persons who remain ambulant throughout the attack; (3) of convalescents (acute bacillus carriers); and (4) of persons who, though apparently in good health, are either temporary or chronic bacillus carriers. In order to safeguard the family and the community against these sources of infection, it is necessary to have the sewage of all persons—the sick and the well—properly disposed of. The report of the United States Army Commission<sup>a</sup> on the prevalence of typhoid fever in the national encampments during the Spanish-American war of 1898, if read with understanding, is throughout a most eloquent appeal for proper sewage disposal. Among 107,973 men in these encampments there were 20,738 cases of and 1,580 deaths from typhoid fever. In 90 per cent of the volunteer regiments the disease broke out within eight weeks after camp was occupied. Intelligent disposal of sewage in the encampments would have prevented, at a conservative estimate, over 75 per cent of this occurrence of sickness and death.

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<sup>a</sup> Report on the Origin and Spread of Typhoid Fever in the United States Military Camps during the Spanish War of 1898; by Walter Reed, Victor C. Vaughan, and Edward O. Shakespeare. 2 vols., Washington, 1904.

The lack of water-closets or privies and the use of faulty water-closets or privies in a community constitute a grave menace to public health. Infection in excreta improperly disposed of may be carried by drainage or seepage, or on the feet of chickens, hogs, dogs, cats, etc., to the local water supply. It may be conveyed by flies and other insects, and by fingers directly to foods in the kitchen or dining room or to the mouths of persons. The scattering of human excreta along railway lines from the very faulty "sanitary" arrangements on passenger coaches<sup>a</sup> constitutes an entirely unnecessary danger which should be corrected by legislative enactment. In communities unprovided with good water-carriage sewerage systems, health officers should strive unceasingly to secure the adoption of safe methods of sewage disposal. If the pail system or the dry-earth closet system has to be used, a model privy should be kept on exhibition at the health office. The health officer, by all means, should have at his own home a properly constructed and managed privy. What the health officer does to protect his own family frequently will impress the people more than his official proclamations.

(7) *Prevent the introduction of infection from without through the water supply, the milk supply, and the general food supply.*—To determine the importance of these supplies as factors in the spread of typhoid infection careful, and in some instances prolonged, epidemiologic studies are necessary. The results of bacteriologic examinations of the water and milk supplies may give helpful information, but as a rule more can be gained by a field investigation, including a sanitary inspection of the watershed, the milk shed, the truck farms, and the oyster beds, and by an investigation of the individual cases of typhoid fever to determine the sources of water, milk, vegetables, shellfish, etc., used prior to illness.

The health officer can, and should, make these investigations, and by doing so he will be able as a rule to determine the principal sources of infection. A number of very practical obstacles may be encountered in trying to have the infection from without the community safeguarded against, but by persistently keeping the facts before the public the health officer can succeed in the vast majority of instances in securing the sinews of sanitation—money—necessary to the establishment of such safeguards, even if the safeguard necessary be a costly filtration plant or a municipal pasteurizing plant.

(8) *Secure the cooperation of practicing physicians.*—It is well for the members of the local medical profession to have something to do with the appointment of the local health officer. In some instances the antagonism of the physicians in a community to the health officer is due partly to the fact that they regard him as an outsider not familiar with local problems. If the health officer has been appointed on the recommendation of the local medical profession, the physicians naturally will be inclined to support him in his work. Without the support of the practicing physicians in the community, the local health officer will be seriously handicapped in doing effective work. From ancient times the medical man has been accredited by his tribe with possessing unusual wisdom, and the practicing physician adventurously or inadvertently may remove in a moment from the minds of a

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<sup>a</sup> Barringer, P. B.: "An unappreciated source of typhoid infection." *Medical Record*, 1903, vol. 64, pp. 971-974.

family a perfectly correct impression in regard to some matter of sanitation which the health officer in his campaign of education has taken months or perhaps years to create. By just and equitable dealing with practicing physicians and by making his office a help rather than a hindrance to them in their practice, the health officer can win the support of certainly the majority of the members of the local medical profession. If the individual health officer deserves it, he will come to be regarded by the medical profession as a specialist in his line, and his opinions will be treated with due deference.

(9) *Exercise an influence in the local medical society so that the society may be a school of instruction in the principles of prevention as well as of the cure of disease.*—Here the local problems of sanitation can be considered from the different standpoints of the different physicians. Every local medical society should have a committee on disease prevention, with the local health officer as an active member of it, to bring before the meetings for discussion and resolution the problems at hand.

(10) *Make the health office educative.*—Under a republican form of government "law can successfully enact only the strong convictions of a strong majority," and, therefore, on popular education depends advancement in sanitation. Every health office should contain conspicuously displayed maps, charts, pictures, and other exhibits graphically presenting lessons in sanitation. The public should be encouraged to visit the office for the purpose of receiving instruction. The health officer should employ every possible agency to get and keep popular interest attracted to local problems of sanitation. He should have health bulletins for public distribution issued frequently. He can usually get a good audience to attend popular lectures with exhibits or stereopticon demonstrations. He should give such lectures in public halls, and particularly in public schools, as frequently as the circumstances warrant; and often he can have popular interest kindled by having a sanitarian come from some other community to discuss the local problems. If the articles are properly prepared, the columns of the local newspaper can be made a most potent influence for the advancement of sanitation. In the campaign of education the health officer should devote especial attention to the physicians, the business men, and the legislators of the community.

Such are some of the things that the local health officer can do and should do in the prevention of typhoid fever. Summed up, they mean just this: He can and should do his best, and so place the burden of responsibility for whatever failures there may be upon the people whom he serves.